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भारतीय मानक

पाइप फ्लैंग और उष्मा विनिमयित्र फ्लैंग के लिए धातु की
जैकेटित गार्स्केट — विशिष्टि
(पहला पुनरीक्षण)

Indian Standard

METAL JACKETED GASKETS FOR PIPE FLANGES
AND HEAT EXCHANGER FLANGES — SPECIFICATION
(*First Revision*)

ICS 23.040.60; 23.040.80; 71.120.30

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Price Group 3

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Gasket and Packing Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1984. The experience gained in implementation of the standard and revision/superseding of reference standards have necessitated this revision. The requirements of metal jacketed gaskets used in pipe flanges have been incorporated. Sizes and class ratings covered in this standard are as per ASME 16.20, gasket for ASME.B.16.5 Flanges, API 601, gasket for API 605 Flange. Identification marking on metal jacketed gaskets has been included. Dimensions and tolerances have been modified.

The composition of Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the results of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

METAL JACKETED GASKETS FOR PIPE FLANGES AND HEAT EXCHANGER FLANGES — SPECIFICATION (*First Revision*)

1 SCOPE

This standard covers the design, material, construction, shape, dimensions and tolerances, identification marking of metal jacketed gaskets used in pipe flanges and heat exchanger flanges.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below:

<i>IS No.</i>	<i>Title</i>
410 : 1977	Cold rolled brass sheet, strip and foil
513 : 2008	Cold reduced low carbon steel sheet and strip (<i>fifth revision</i>)
737 : 2008	Wrought aluminium and aluminium alloy sheet and strip for general engineering purposes (<i>fourth revision</i>)
4131 : 1967	Nickel copper alloy castings
8362 : 1977	Copper and copper alloy rolled plates for condensers and heat exchangers

3 TYPES

Metal jacketed gaskets shall be of the following two types:

- a) *Type 1* — Metal jacketed gaskets used in pipe flanges. It is identified by its flange nominal bore and its pressure class rating. Sizes and class ratings covered in this standard are:
 - 1) Nominal bore — 15 mm to 1 500 mm; and
 - 2) Pressure rating — 1 MPa to 16.6 MPa.
- b) *Type 2* — Metal jacketed gaskets used in heat exchanger flanges. These are individually designed to suit dimension and pass partition ribs to suit to the respective flanges.

4 MATERIAL OF CONSTRUCTION

4.1 Generally the following metal sheets with the specified hardness shall be used for the fabrication of metal jacketed gaskets used in pipe flanges and heat exchanger flanges:

- a) Soft iron/soft annealed cold rolled carbon Steel 90 BHN *Max* (*see IS 513*)
- b) Soft annealed brass 80 BHN, *Max* (*see IS 410*)
- c) Soft annealed copper 80 BHN, *Max* (*see IS 8362*)
- d) Soft annealed aluminium 80 BHN, *Max* (*see IS 737*)
- e) Monel (*see IS 4131*) 80 BHN, *Max*
- f) Solution annealed stainless steel — All grades 140 BHN, *Max*
- g) 5 Cr, ½ Mo — Alloy steel 140 BHN, *Max*
- h) Inconel — All grades 140 BHN, *Max*

Any other special material as specified by the purchaser with required hardness also may be used. Jacketing metal shall be specified by the customer to suit the medium handled, its application compatibility and operating temperature.

4.2 The following soft cushioning filler materials shall be used in the metal jacketed gaskets used in the piping flanges and heat exchanger flanges:

- a) Flexible graphite;
- b) Polytetrafluorethylene;
- c) Ceramic;
- d) Non-asbestos; and
- e) Chrysotile asbestos mill board.

Any other filler material as specified by the purchaser may also be used.

5 CONSTRUCTION

5.1 Metal jacketed gaskets shall be made with soft cushioning filler material enclosed in a metal cladding.

The metal jacketed gaskets used in pipe flanges and heat exchanger flanges shall be of double jacketed construction.

5.1.1 Metal jacketing edge folded lips in ID (Inside diameter) and OD (Outside diameter) of the gasket shall be 2.5 mm minimum.

5.1.2 The width of the pass partition rib in the metal jacketed gasket used in heat exchanger flanges shall be 10 mm or, as specified by the purchaser.

5.1.3 Metal jacketed gasket shall consist of 3 parts for its fabrication as given below:

- a) Channel shape formed cladding metal;
- b) Plain metal filler; and
- c) Soft cushioning filler.

5.2 Cutting of Metal Sheet, Butt Weld Joints and Laying of Soft Cushioning Filler Material in Metal Jacketed Gasket

5.2.1 Complete metal including the pass partition rib shall be cut from single sheet for the integral type gasket for heat exchanger.

5.2.2 Peripheral ring of the gasket shall be cut from single metal sheet. Pass partition ribs shall be separately fabricated. The pass partition ribs shall be correctly positioned and tack welded to the inner diameter of the gasket peripheral ring.

5.2.3 When the size of sheet to be used for the fabrication of metal jacketed gasket is exceeding the commercially available metal sheet size then butt weld joints are permitted.

5.2.4 Weld joints shall be spaced minimum 60° apart.

5.2.5 Weld joints in the top and bottom metal cladding of the gasket shall not be in line and shall be offset by a distance of minimum 150 mm.

5.2.6 Soft cushioning filler shall be placed in the channel formed metal properly without gap and overlapping.

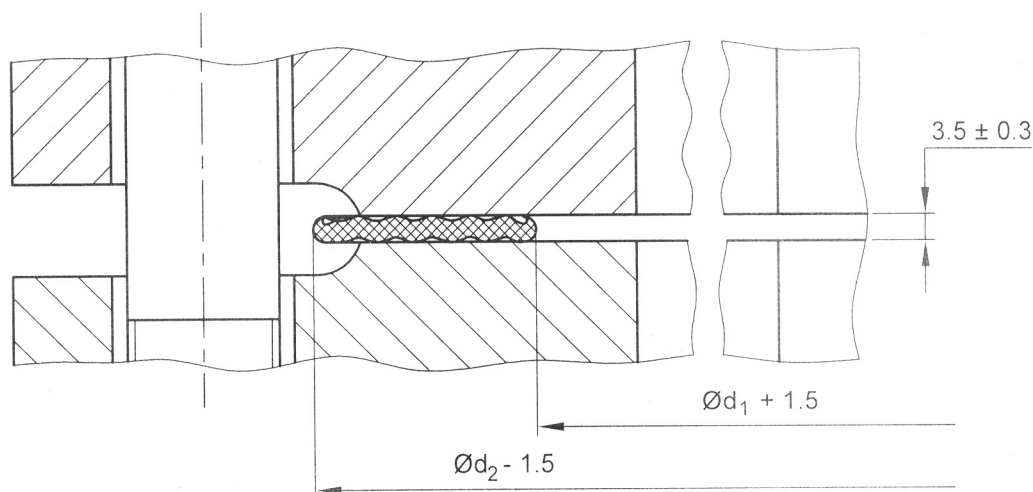
5.2.7 The thickness of the metal sheet used for the fabrication of metal jacketed gasket shall be 0.3 mm to 0.5 mm.

5.2.8 The thickness of the soft cushioning filler material used for the fabrication of metal jacketed gasket shall be 1.5 mm to 3 mm.

6 DIMENSIONS AND TOLERANCES

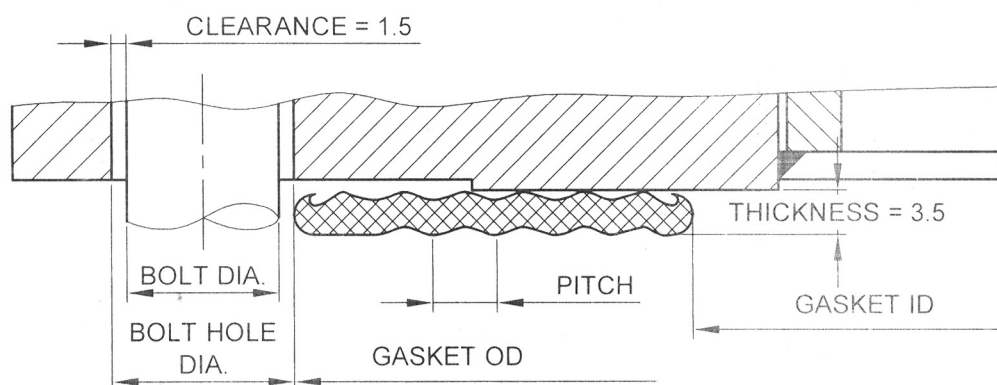
6.1 Metal Jacketed Gaskets Used in Pipe Flanges

Dimensions of flange nominal bore and gaskets of various pressure ratings shall be as given in Table 1 (to be read with Fig. 1 and Fig. 2).



All dimensions in millimetres.

FIG. 1 METAL JACKETED PLAIN GASKET



All dimensions in millimetres.

FIG. 2 METAL JACKETED CORRUGATED GASKET

Table 1 Dimensions of Metal Jacketed Gaskets Used in Pipe Flanges

(Clause 6.1)

All dimensions in millimetres.

Sl No.	Flange DN (Nominal Pipe Size)	Gasket (ID) d_1	Gasket (OD) d_2						
			1.0 MPa	2.0 MPa	2.6 MPa	4.0 MPa	6.0 MPa	10.0 MPa	16.6 MPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	15	22.4	44.5	50.8	—	50.8	—	60.5	66.8
ii)	20	28.7	54.1	63.5	—	63.5	—	66.8	73.2
iii)	25	38.1	63.5	69.9	—	69.9	—	76.2	82.6
iv)	32	47.8	73.2	79.5	—	79.5	—	85.9	101.6
v)	40	54.1	82.6	92.2	—	92.2	—	95.3	114.3
vi)	50	73.2	101.6	108.0	—	108.0	—	139.7	143.0
vii)	65	85.9	120.7	127.0	—	127.0	—	162.1	165.1
viii)	80	108.0	133.4	146.1	—	146.1	165.1	171.5	193.8
ix)	90	131.8	171.5	177.8	174.8	190.5	203.2	206.6	231.9
x)	125	152.4	193.8	212.9	209.6	238.3	244.6	251.0	276.4
xi)	150	190.5	219.2	247.7	244.6	263.7	285.8	279.4	314.5
xii)	200	238.3	276.4	304.8	301.8	317.5	355.6	349.3	384.3
xiii)	250	285.8	336.6	358.9	355.6	397.0	431.8	431.8	473.2
xiv)	300	342.9	406.4	419.1	416.1	454.2	495.3	517.7	546.1
xv)	350	374.7	447.8	482.6	479.6	489.0	517.7	574.8	—
xvi)	400	425.5	511.3	536.7	533.4	562.1	571.5	638.3	—
xvii)	450	489.0	546.1	593.9	590.6	562.1	635.0	701.8	—
xviii)	500	533.4	603.3	651.0	644.7	679.5	695.5	752.6	—
xix)	600	641.4	714.5	771.7	765.3	787.4	835.2	898.7	—
xx)	650	673.1	722.4	768.4	743.0	762.0	835.1	—	—
xxi)	700	723.9	773.2	822.5	797.1	816.1	898.7	—	—
xxii)	750	774.7	824.0	882.7	854.2	876.3	955.8	—	—
xxiii)	800	825.5	877.8	936.8	908.1	930.4	1 013.0	—	—
xxiv)	850	876.3	931.9	990.6	958.9	993.9	1 070.1	—	—
xxv)	900	927.1	984.3	1 044.7	1 019.3	1 044.7	1 120.9	—	—
xxvi)	950	977.9	1 041.4	1 095.5	1 070.1	1 101.9	1 197.1	—	—
xxvii)	1 000	1 028.7	1 092.2	1 146.3	1 124.0	1 152.7	1 247.1	—	—
xxviii)	1 050	1 079.5	1 143.0	1 197.1	1 174.8	1 216.2	1 298.7	—	—
xxix)	1 100	1 130.3	1 193.8	1 247.9	1 228.9	1 267.0	1 365.5	—	—
xxx)	1 150	1 181.1	1 252.5	1 314.5	1 286.0	1 324.1	1 432.1	—	—
xxxi)	1 200	1 231.9	1 303.3	1 365.3	1 343.2	1 387.6	1 482.9	—	—
xxxii)	1 250	1 282.7	1 354.1	1 416.1	1 400.3	1 444.8	—	—	—
xxxiii)	1 300	1 333.5	1 404.9	1 466.9	1 451.1	1 495.6	—	—	—
xxxiv)	1 350	1 384.3	1 460.5	1 527.3	1 514.6	1 552.7	—	—	—
xxxv)	1 400	1 435.1	1 511.3	1 590.8	1 565.4	1 603.5	—	—	—
xxxvi)	1 450	1 485.9	1 576.3	1 652.5	1 616.2	1 660.7	—	—	—
xxxvii)	1 500	1 536.7	1 627.1	1 703.3	1 679.7	1 730.5	—	—	—

6.1.1 Tolerances

- | | |
|--------------------------------------|---|
| a) Thickness of gasket | : $\begin{smallmatrix} +0.8 \\ -0 \end{smallmatrix}$ mm |
| b) OD for gaskets 25 mm to 600 mm | : $\begin{smallmatrix} +0 \\ -1.6 \end{smallmatrix}$ mm |
| c) OD for gaskets 650 mm to 1 500 mm | : $\begin{smallmatrix} +0 \\ -3 \end{smallmatrix}$ mm |
| d) ID for gaskets 25 mm to 600 mm | : $\begin{smallmatrix} +1.6 \\ -0 \end{smallmatrix}$ mm |
| e) ID for gaskets 650 mm to 1 500 mm | : $\begin{smallmatrix} +3 \\ -0 \end{smallmatrix}$ mm |

6.2 Metal Jacketed Gaskets Used in Heat Exchanger Flanges

6.2.1 Heat exchanger gaskets shall be as shown in Fig. 3.

6.2.2 Metal jacketed gaskets used in heat exchanger flanges shall be individually designed for shape and

dimension and custom-built as per the details provided by the purchaser.

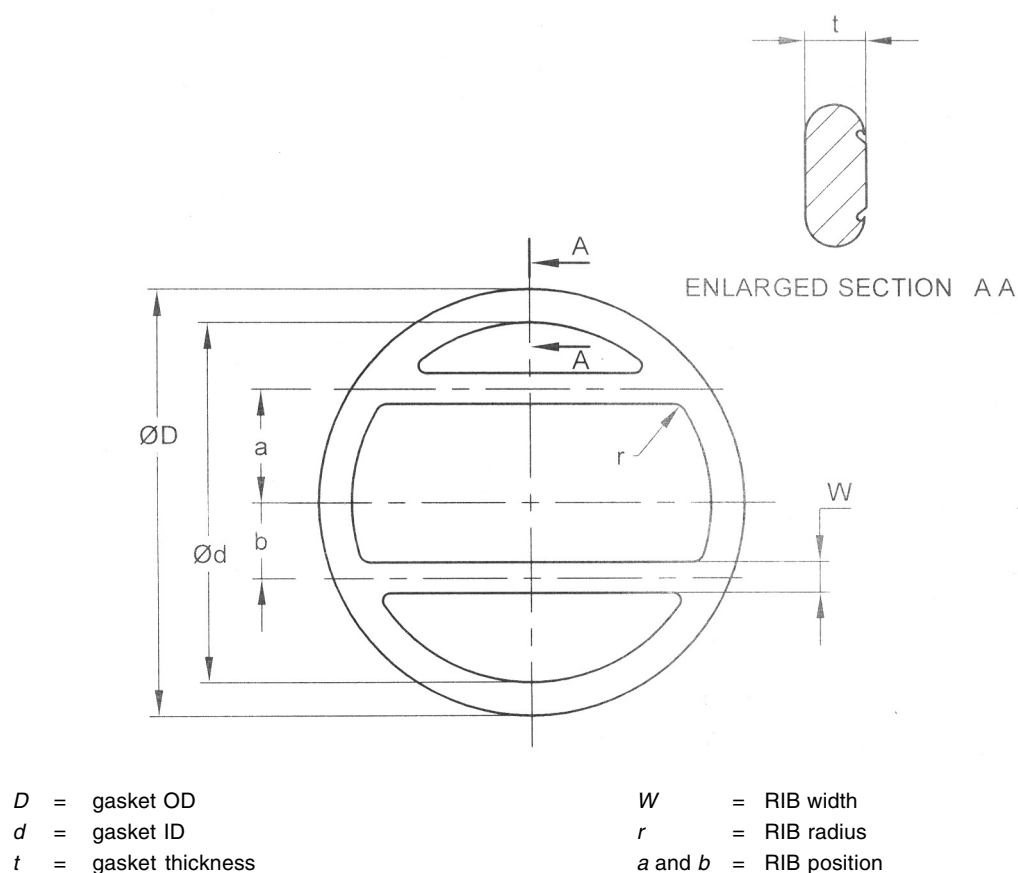
6.2.3 Tolerances

- | | |
|------------------------------------|---|
| a) OD of the gasket | : $\begin{smallmatrix} +0 \\ -0.8 \end{smallmatrix}$ mm |
| b) ID of the gasket | : $\begin{smallmatrix} +0.8 \\ -0 \end{smallmatrix}$ mm |
| c) Thickness of the gasket | : $\begin{smallmatrix} +0.35 \\ -0 \end{smallmatrix}$ mm |
| d) Width of the pass partition rib | : $\begin{smallmatrix} +0 \\ -0.8 \end{smallmatrix}$ mm |
| e) Position of the rib | : $\begin{smallmatrix} +0.8 \\ -0.8 \end{smallmatrix}$ mm |

7 INFORMATION TO BE PROVIDED BY THE PURCHASER

7.1 Metal Jacketed Gasket Used in Pipe Flanges

- Metal sheet used for cladding;
- Soft cushion filler material used in the gasket;
- Standard/dimension for pipe flange gasket, and



All dimensions in millimetres.

FIG. 3 METAL JACKETED GASKETS FOR HEAT EXCHANGER FLANGES

- d) Type of the gasket like plain face or corrugated. If corrugated pitch shall be 2.5 to 3.0 mm.

7.2 Metal Jacketed Gaskets Used in Heat Exchanger Flanges

- a) Metal sheet used for cladding;
- b) Soft cushion filler material used in the gasket;
- c) Shape and pass partition rib location details;
- d) Orientation details of the gasket;
- e) Full dimension of the gasket; and
- f) Any other special information and details by the purchaser.

8 INSPECTION

The purchaser or his representative shall have free access to visit the inspection and testing facility of the manufacturers.

9 MARKING

9.1 Identification Marking

Each metal jacketed gasket shall be marked with waterproof ink or equivalent. Where gasket size does not permit such markings, a separate attached marking tag (made of metal/cloth, etc) may be used. The lettering height shall be a minimum of 5 mm. The following information shall be included in the marking:

- a) Manufacturer's name;
- b) Flange standard for pipe flange gasket;
- c) Flange nominal bore for pipe flange gasket;
- d) Gasket drawing number/part number/equipment number given by the purchaser for heat exchanger gasket;

- e) Pressure rating for pipe flange gasket;
- f) Metal used for cladding;
- g) Soft cushion filler used in the gasket; and
- h) Quantity in each bundle.

9.2 BIS Certification Marking

Metal jacketed gaskets may also be marked with the Standard Mark.

9.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which a licence for the use of the Standard Mark may be granted to the manufacturers or producers may be obtained from the Bureau of Indian Standards.

10 PACKING

10.1 The gasket shall be packed with, dust free and moisture resistant material.

10.2 The gasket bundles shall be packed in the wooden crate/sufficiently strong box.

10.3 Packing list should be kept inside the box or displayed on the box with proper care based on agreement with the purchaser.

11 SHIPMENT

11.1 Gaskets shall be properly protected from rust and other surface damage.

11.2 Gaskets shall be properly packed and protected from distortion and damage during transit.

11.3 Gasket packing shall be marked with the safe handling symbol and instruction.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Gasket and Packing Sectional Committee, MED 30

<i>Organization</i>	<i>Representative(s)</i>
Indian Institute of Technology, Kharagpur	SHRI AJIT K. BANTHIA (Chairman)
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Amendments Issued Since Publication

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